Chapter 1 Why you should care about design

Additional self-test questions

Q1.1 (Nothing to do with experimental design really): Humans have tremendous variation in the patterning of grooves on our fingers, allowing us to be individually identified by our fingerprints. Why do you think there is such variation?

Q1.2 Imagine the research task that you want to address is to estimate the fraction of the electorate who plan to vote in the next elections for the Scottish Parliament. You plan to do this by surveying a sample of the appropriate statistical population. Define this population carefully in your own words.

Q1.3 In the example above, how might you choose a representative sample for the survey?

Q1.4 Imagine that you personally are bidding to survey likelihood of voting for a national newspaper. What number of people would you aim to gather data on?

Q1.5 If you wanted to explore if there was a correlation between the entrance charge for UK public zoos and how far north the zoo was, then how would you go about this?

Q1.6 A student project involves comparing the size of slugs on organic and other farms. The student asks how many slugs they should measure on each farm, and the supervisor replies 'as many as you can'. Was this an appropriate response?

Q1.7 Imagine you are given the project of watching a grassy area at your local university in winter. When birds land on the grass to forage, you record for how long they stay before they fly off. Do you have any ethical concerns?

Q1.8 Imagine the project is the same as the above, but now you are recording how long students sit on the grass in summer. Are your ethical concerns different?

Q1.9 An early draft of the book contained the following real example, but the authors were persuaded that it was both a flawed way of collecting data and ethically objectionable.

> A social scientist wanted to find out what newspapers people in a given street read. The problem is that people can be expected to lie when you ask them, saying that they read a broadsheet when they actually read a tabloid or no newspaper at all. The social scientist got around this by saying that he was piloting a paper recycling scheme, providing people with sacks, and asking them to deposit all their waste paper in the sack which he

collected at the end of the week. This allowed him to evaluate which papers were read by looking at the papers placed in the sacks. Having obtained this information, he took the contents of all the sacks to a paper bank.

Why is this unethical and scientifically flawed?

Q1.10 The book states that the sheep in a flock will not all be the same weight. Can you explain this in terms of the underlying biology of sheep?

Q1.11 Explain why confounding factors can be a problem in biological studies, using an example.